

Defining Fire and Wilderness Objectives: Applying Limits of Acceptable Change

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Abstract- The Limits of Acceptable Change (LAC) planning process was developed to help define objectives for recreation management in wilderness. This process can be applied to fire in wilderness if its conceptual foundation is broadened. LAC would lead decision makers to identify a compromise between the goal of allowing fire to play its natural role in wilderness and various constraints, such as threats to life and property. Fires would be allowed to burn as prescribed natural fires as long as preestablished criteria related to these constraints were not exceeded.

People interested in the management of fire in wilderness have recognized the need for specific management objectives for many years. They have debated whether objectives should be defined in structural or process terms (Bancroft and others 1985; Bonnicksen 1985) and have questioned the desired precision of objectives (Vale 1987). However, they have had little success in writing specific objectives for fire in wilderness.

Management of recreation in wilderness changed recently with development of the Limits of Acceptable Change (LAC) planning process (Stankey and others 1985). While it is still too early to evaluate the effect of this process on wilderness quality, the process has clearly changed the nature of wilderness management. The LAC process is being implemented in scores of wilderness areas and has been recommended in both a GAO report (U.S. GAO 1989) and in legislation recently introduced in Congress (H.R. 4325, 102d Congress).

The enthusiastic response of wilderness managers to LAC as a means of dealing with recreation issues raises the question, can it be applied to other wilderness management issues—such as fire? This paper was spurred by interest in that question. Purposes of this paper are to (1) reiterate some of the reasons why defining specific objectives is critical to managing fire in wilderness, (2) describe how LAC has been used to develop specific objectives for recreation management in wilderness, and (3) explore what this experience suggests about defining objectives for fire management in wilderness. A final purpose—which only surfaced as this paper developed—is to assess the general utility of the LAC process as a planning tool for wilderness management.

In: Brown, James K, Mutch, Robert W.; Spoon, Charles W.; Wakimoto, Ronald H., tech. coords. 1995. Proceedings: symposium on fire in wilderness and park management; 1993 March 30-April 1; Missoula, MT. Gen. Tech. Rep. INT-GTR-320. Ogden, UT: U.S. Department Of Agriculture, Forest Service, Intermountain Research Station.

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GOALS, OBJECTIVES, AND STANDARDS

Wilderness management goals, as defined in the Wilderness Act, stress protection and management “so as to preserve natural conditions.” Other phrases in the Act that are useful in defining goals include reference to “primeval character and influence,” “wilderness character,” and “unimpaired condition.” These phrases imply that wilderness managers are to maintain or restore the wilderness conditions and processes that existed prior to the period of increasing population, “expanding settlement, and ‘growing mechanization’ that spurred Congress to pass the Wilderness Act.

Many studies have demonstrated the importance of fire in shaping the character of most wilderness landscapes (Kilgore and Heinselman 1990). Clearly, wilderness managers cannot meet the goal of preserving natural conditions without allowing fire to operate in a natural manner. Although it might be possible to maintain the structural elements of a natural landscape without natural fire (for example, by using silvicultural treatments or prescribed burns), the fire processes themselves would no longer be natural.

Unfortunately, the goal of restoring fire to its natural role in wilderness is not entirely possible because the goals of the Wilderness Act are not paramount in society. Instead, wilderness goals compromise and are compromised by other goals, particularly concerns for (1) clean air, (2) wilderness visitor safety, (3) preservation of cultural resources, (4) preservation of threatened and endangered species, (5) protection of commercial operations, and (6) protection of land and property. Even the Wilderness Act recognizes the need to control fire in wilderness, stating that “such measures may be taken as may be necessary in the control of fire...subject to such conditions as the Secretary deems desirable.” Achievement of wilderness goals is also constrained by (1) the accumulated effects of decades of fire suppression, (2) suppression of fires on lands adjacent to wilderness, and (3) undesirable ignitions that occur within and adjacent to wilderness.

Natural resource professionals have traditionally relied on professional judgment when compromising among goals. The advantage of this tradition is flexibility; the disadvantage is implicit and subjective decision making that is no longer acceptable to the public. Given the competing demands our pluralistic society places on resources, the public requires explicit and objective decision making and opportunities for public involvement. Specification of management goals, objectives, and standards is one of the foremost requisites for explicit decision making that is accessible to the public.

Goals, objectives, and standards can serve many purposes. In this paper I focus primarily on the utility of objectives and standards for (1) defining desired conditions related to individual goals and (2) defining a compromise between conflicting individual goals. Let me begin by defining the terminology I use.

First, the distinctions between goals, objectives, and standards are neither clear nor defined in a consistent manner. Distinctions usually relate to the specificity and attainability of statements of intent (Hendee and von Koch 1990). Goals are usually general and lofty statements-impossible dreams. They are relatively easy to articulate, but they are of limited value operationally. Objectives are more specific but may or may not be attainable. The term 'standard' is usually reserved for statements of intent that are both specific and attainable. Thus standards are a type of objective. All standards are objectives, but not all objectives are standards.

Second, wilderness objectives can be written to specify preservation of certain conditions (implying structural considerations) or certain processes. Debate over the preferred approach is important but incidental to this paper. For convenience, I will use the term 'condition,' without any implication that structure-based approaches are preferable to process-based approaches,

Desired Conditions

Management objectives are useful as targets for management programs. For each goal or management concern it should be possible to write specific objectives that define what a management program is trying to accomplish. These objectives can relate to such issues as maintaining natural conditions, protecting life and property from fire, or maintaining clean air. Examples of desired-condition objectives might include "to see that the number, size, and intensity of fires approximates those that occurred under a natural fire regime" or "to see that no lives are lost and no property is destroyed as a result of fire."

These objectives guide managers as they make decisions about how to respond to an ignition or as they develop prescribed burn programs or other programs that will influence wilderness fire and its effects. For this purpose, objectives should be stated in terms of desired conditions or results. They should specify the ideal, whether this ideal is attainable or not. Statements should be as specific and unambiguous as possible.

Compromise

The problem with desired-condition objectives is that they may not be attainable, particularly if they conflict with other objectives. Consequently, wilderness managers must often balance conflicting individual goals. Objectives can serve the role of explicitly defining the compromise between opposing goals. For example, Kilgore and Heinselman (1990) stated that the general management objective for a wilderness fire program is "to restore fire to

its natural role in the ecosystem to the maximum extent consistent with safety of persons, property, and other resources." This statement identifies both natural fire and safety as goals and acknowledges that they conflict with each other. It also establishes the relative importance of these two goals, by stating that safety concerns will constrain the extent to which "naturalness" goals are achieved. The goal of natural fire will ultimately be compromised if safety concerns become too severe.

As written, this objective is probably attainable. The objective states an acceptable compromise condition, not a desired condition. The objective is not "natural fire"; the objective is fire that is "as natural as possible," given other constraints. The problem with this objective is that it is not specific enough. As written, it would not be possible to evaluate whether or not the objective has been met. Objectives that define compromises between goals need to be both specific (or measurable) and attainable.

RECREATION MANAGEMENT AND LAC

Wilderness managers have always faced the challenge of wrestling with conflicting goals. One of the most troublesome dilemmas has been the conflict between recreation use and preservation of natural conditions in wilderness. The Wilderness Act specifies that natural conditions should be preserved, but it also states that wilderness "shall be administered for the use and enjoyment of the American people." Because use inevitably causes some deviation from natural conditions, both goals cannot be attained.

Concern over this dilemma initially surfaced more than 50 years ago. Early students of the problem suggested that the solution was to restrict use to an area's recreational saturation point (Sumner 1942), or carrying capacity. Further research, however, made it clear that an area's carrying capacity can only be defined in relation to an area's management objectives (Lime and Stankey 1971). Thus there was early recognition that the initial step in dealing with the conflict between recreational use and wilderness preservation must be the development of specific management objectives.

For decades little progress was made in defining specific management objectives for wilderness. The objectives that existed in most plans were neither specific nor attainable. Many plans had objectives such as "to maintain natural vegetative conditions" and "to provide outstanding opportunities for primitive and unconfined recreation." In the meantime, management implemented programs that, in effect, established a compromise between competing objectives. For example, some managers attempt to provide more-natural conditions by reducing amount of use. However, this reduces use and enjoyment of wilderness, violating one of the goals of the Wilderness Act. Without specific objectives, compromises are implicit and subjective, and it is seldom possible to objectively evaluate the relative costs and benefits of management Programs.

The LAC Process

The Limits of Acceptable Change (LAC) process was developed in an attempt to help managers develop specific objectives and base their management program on these objectives. It was initially conceived as a way to deal with the so-called "carrying capacity issue." The basic premise behind the process was: to allow some recreational use of wilderness, some undesirable impact would have to be accepted. The key, then, is to define the optimal balance between the goals of allowing recreational use and preserving wilderness conditions.

The LAC process, in its simplest form, consists of four interrelated steps: (1) establishing quantitative standards that define acceptable wilderness conditions; (2) comparing existing conditions to these standards for acceptable conditions; (3) developing management strategies to deal with problem situations, where current conditions do not meet standards of acceptability, and (4) periodic monitoring of conditions to reevaluate whether or not standards are being met.

To illustrate how the process works, consider the conflict between recreation use and preservation of natural conditions, particularly at wilderness campsites. Where managers choose to allow high levels of recreation use, campsite impacts will also be high. Where they choose to keep campsite impacts to minimal levels, recreation use will have to be kept to low levels. Most situations should lie between these extremes; the key is to define a balance.

A fundamental premise of the LAC process is that primary attention must be given to wilderness conditions and the actions needed to protect or achieve acceptable conditions (Stankey and others 1985). In the Bob Marshall Wilderness, maximum acceptable levels of campsite density and campsite impact have been specified (Stankey and others 1990). For example, standards for one management zone state that there will be no more than one highly impacted campsite per square mile. This and other standards define the balance between use and preservation in an explicit way. If campsite conditions are "worse" than standards, management is obliged to improve conditions, even if this means restricting recreation use. Conversely, if conditions are "better" than standards, management should not restrict recreation use simply to prevent further deterioration of conditions. Actions to prevent campsite deterioration would be appropriate only if they did not conflict with other management objectives (for example, teaching a low-impact ethic would be appropriate).

Although the people who developed the LAC process of whom I am one were not explicit about this, the aim of LAC is to define the optimum balance between conflicting goals. The process in its most generic form involves: (1) recognizing the conflict between goals; (2) establishing that one goal will constrain the others; and (3) defining minimally acceptable conditions (LAC standards) for this constraining goal. Where there is conflict between goals, neither goal can be maximized, but through the LAC process the trade-off between goals is optimized. Moreover, the standards make that trade-off explicit.

This approach is not an uncommon one in our society. An example involves the problem of winter air pollution in

Montana's Missoula Valley. People like to heat their homes with wood, but wood burning causes a significant air pollution problem. Ideally, people would be free to burn wood whenever they wanted and also be able to breathe clean air in winter. Unfortunately, this is not possible. Missoula County officials decided that concern for clean air would constrain wood burning, and they established an air quality standard. Now, people are allowed to freely burn as long as this air quality standard is not violated. Whenever air quality is worse than the standard, the freedom to burn wood is removed. Neither goal is maximized. Missoula air is not clean and woodburners are not free to burn whenever they want. However, the minimally acceptable air quality standard optimizes the two goals in an explicit manner. This is exactly analogous to the LAC process.

What Has LAC Accomplished?

So far, the LAC process has been used primarily to deal with recreation issues in wilderness. It has enabled managers to develop specific, measurable standards for some critical recreation concerns, such as campsite impacts and encounters between recreation users. These standards perform the important role of defining the optimum balance between conflicting goals. They provide explicit criteria for deciding when recreation use will be restricted and when it will not be restricted. This assures the maintenance of conditions that are at least minimally acceptable, without unduly restricting recreation use.

What the LAC process does not provide are specific management objectives that define desired conditions for individual goals. For example, the desired level of campsite impact in the Bob Marshall Wilderness is not one highly impacted campsite per square mile (the LAC standard). This is the condition that is considered minimally acceptable to allow recreation use. The desired condition would probably be no campsite impact at all. Management should seek to achieve these desired conditions; however, they should not compromise other goals (such as allowing recreation use) if conditions are at least acceptable.

In sum, the only kinds of objectives that the LAC process provides are statements of minimally acceptable conditions (standards) for the goals that constrain other goals. Desired conditions are not specified for any goals and minimally acceptable conditions are not defined for constrained goals. This suggests some shortcomings of the LAC process as a general planning framework. Its benefits, however, are substantial.

LAC STANDARDS FOR FIRE IN WILDERNESS

How can the LAC concept be applied to fire in wilderness? Initially, I supposed that the analogous approach would be to write quantitative, attainable standards for natural conditions. Although this approach has been strongly advocated by some (Bonnicksen 1985), previous attempts to do this have been frustrating because (1) there is little consensus about what "natural" is (Kilgore

and Heinselman 1990) and (2) "natural" conditions are always changing (Christensen 1988). My analysis suggests that the LAC process may be more helpful in defining compromise than in establishing naturalness objectives.

Compromise Standards

Standards that define the compromise between opposing goals could be very useful in managing fire in wilderness. Of the many conflicting goals that face fire managers, perhaps the conflict between preservation of natural conditions and the safety of people and property is most compelling. How this conflict is resolved determines when fires are allowed to burn in wilderness and when they are suppressed. I will focus on this particular conflict as an example, but LAC could also be applied to other goals that constrain natural fire. These other goals may be much more constraining in smaller wildernesses where prescribed natural fire programs may be impractical.

The LAC approach would involve deciding which of these two goals is the constraining one and then defining minimally acceptable conditions for that goal. In thinking about the conflict between preservation of natural conditions in wilderness and concern about the safety of people and property, it seems clear that safety is the constraining goal and natural conditions is the constrained goal. Hilgore and Heinselman's (1990) objective (paraphrased) stated that fire should be restored to its natural role to the "maximum extent consistent" with maintaining an acceptable level of safety of life, property, and other resources. Clearly, they implied that safety will constrain concern for allowing fire to play its natural role. Therefore, this compromise must be defined by specifying an acceptable level of safety—not an acceptable deviation from natural conditions. Limits of acceptable change could be defined for the role of fire, but they would never be met if achieving them entailed an unacceptable degree of risk.

This suggests that what is needed are quantitative, unambiguous statements of minimum levels of safety (or maximum levels of risk) associated with allowing natural fires to burn in wilderness. These preestablished explicit criteria (standards) would dictate when fires are to be suppressed in wilderness. Most lightning fires would be allowed to burn as a part of the wilderness landscape and only where risks exceed acceptable levels would these fires be declared wild and managed accordingly. Similar standards of acceptability could also be written for other conflicting goals such as levels of smoke, threats to threatened and endangered species, and disruption of recreation. Lightning fires could be allowed to burn as prescribed natural fires as long as preestablished standards were not exceeded.

For example, given a concern about the threat of fire to private property outside the wilderness, we might develop an indicator of the likelihood of a fire or ignition escaping from the wilderness. I'm not certain how best to measure this. Perhaps models could be developed that would incorporate such factors as fuel levels, weather, ignition location, time of year, and available manpower, and predict this "likelihood of escape." Perhaps we would be willing to accept a 20 percent risk of a fire burning outside wilderness, but no more. This would be made explicit in a

standard. Then we would be in a position to allow new ignitions to burn as long as the models predicted a likelihood of escape of less than 20 percent. New ignitions or prescribed fires would be suppressed whenever the 20 percent standard was exceeded.

Specific standards would have at least four positive effects. First, compromise would occur within a more visible socio-political context and established standards would be explicit and predetermined. Second, specific standards would ensure that fires are suppressed when they are likely to cause unacceptable problems. Third, the goal of naturalness in wilderness would not be unduly compromised because fires would be allowed to burn in all cases where their effects are likely to be acceptable. Fourth, the personal biases of managers, whatever their commitment to naturalness goals in wilderness or their aversion to risk, would have less influence on wilderness fire programs.

Naturalness Objectives

The LAC process only requires that standards be written for constraining goals. Because naturalness is the constrained goal in this case, the LAC process would be silent about naturalness goals. Nevertheless, some objectives related to naturalness are clearly needed. In my opinion, naturalness objectives would be most useful as statements of desired conditions even if these desired conditions are impossible to attain. These statements could be used to evaluate the appropriateness of alternative management strategies and, secondarily, to evaluate performance.

Attempts to define desired-condition objectives for fire and its effects in wilderness have been controversial. Some have called for objectives based on structural conditions (Bonnicksen 1986); others prefer process-oriented objectives (Bancroft and others 1986). Others suggest that the suitability of structural and process goals will vary with fire regime and wilderness size (Agee and Huff 1986). Christensen (1988) suggested that objectives should not be written for maintenance of some average or optimal condition, but rather for some degree of variability or heterogeneity.

These debates are relevant and the questions must be resolved. However, if naturalness objectives are not strictly attainable it may not matter how the issue is resolved. The naturalness of wilderness and parks will be determined more by the levels of risk to personal safety and property that society is willing to accept than by naturalness objectives developed by scientists. Consequently, highly precise definitions of naturalness are desirable but not critical.

CONCLUSIONS

Specific objectives and standards can be useful in defining a compromise between conflicting goals and in defining desired conditions to guide management. The preceding analysis suggests that the LAC process is helpful for defining a compromise but not for defining desired conditions. This suggests something about the types of wilderness fire objectives that will be most useful. It also suggests a need to broaden the LAC concept if it is to be more generally useful.

Wilderness Fire Objectives

The most critical need is for quantitative, attainable standards that specify criteria for making such decisions as whether or not fires need to be suppressed and where and when management ignitions should be used. This could be accomplished by establishing LAC standards for such constraining goals as threats to life and property, visitor protection, smoke production or visibility, disruption of threatened and endangered species, and disruption of recreation. These standards would specify to what extent these goals could be compromised before it would be necessary to compromise wilderness fire goals. Specification of such standards would lead to more consistent and responsive fire management in wilderness.

Within the constraints that such limits will impose, managers should attempt to maximize restoration of fire's natural role in the ecosystem. Objective statements of desired conditions and outcomes will improve these attempts, particularly if they are precise and unambiguous. Therefore, researchers and decision makers should attempt to work toward more precise definitions of naturalness. In the interim, however, even general statements of desired conditions should be sufficient to allow managers to make appropriate decisions about alternative actions.

Reconceiving LAC

LAC concepts must be expanded if they are to be applied broadly beyond the carrying capacity issue for which LAC was originally formulated. Considerable confusion stems from the original report of Starkey and others (1985). The terminology used in that report was not always precise enough. In particular, the notions of desirable conditions and acceptable conditions were used interchangeably, even though it is clear that standards refer to minimally acceptable conditions. In addition, no generic model of the LAC process is presented. The process described is specific only to the carrying capacity dilemma.

These shortcomings could be overcome relatively simply. First, a more generic model of how LAC operates should be developed. In my opinion, it should be explicitly stated that the LAC process involves establishing a compromise between constraining end consigned goals. Standards of acceptability are then defined for the constraining goal. Standards could be developed for wilderness conditions (as implied in Stankey and others 1985) or for goals other than wilderness condition (such as protecting property from fire). This would require a broader interpretation of the LAC process.

In addition to defining these standards of acceptable conditions for the constraining goal, it is also important to define desired conditions for all critical goals and management concerns. These are needed during the steps in the process when management strategies are conceived and implemented. They are also needed in situations where conditions are better than acceptable but worse than desired. Currently, the LAC process does not produce statements of desired conditions. These could be readily included in the process during its early stages, particularly in the development of opportunity class descriptions.

Even with these changes, there may be many wilderness management issues for which LAC is an inappropriate planning framework. Given that LAC is a process for optimizing the balance between conflicting goals, the LAC process does not provide efficient solutions in situations where there is no conflict between goals. Where there is no conflict, objectives should define desired conditions rather than the minimally acceptable conditions that are at the core of the LAC concept. LAC also will not work in situations where planners are unwilling or unable to say that one goal constrains another. This follows from the practice of only writing LAC standards for constraining goals. If they were written for several goals that conflicted with each other there would be situations where it was impossible to meet all standards.

LAC has become a useful and popular tool in planning for the management of recreation in wilderness. From this analysis, it appears that the process could also contribute to planning for the management of fire in wilderness. More critical evaluation and development of the LAC process would facilitate both expanded LAC applications and better application of LAC to recreation. It would also avoid frustrating efforts to apply LAC in situations where it is not well suited.

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